Human Becoming: A Deductive Reconstruction

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Abstract
The emergence of human identity is fundamentally a terminal expression of universal chemical convergence rather than an isolated, Earth-specific anomaly. This paper presents a deductive reconstruction of human becoming, tracing the continuity of systemic recursion from prebiotic molecular blueprints to modern artificial intelligence architectures. By reframing biological DNA as a backward-looking historical ledger rather than a forward-looking teleological blueprint, we establish that evolutionary mechanisms primarily function as archival filtering systems. Furthermore, we demonstrate that phenomenological intention precedes cognitive thought, a reality mirrored structurally in the socialization of the perceptual field and the subsequent externalization of memory through cultural myth and technological artifacts. Ultimately, this deductive framework reveals that humanity represents a recursive layer within a self-writing universe, where the pursuit of truth and structural coherence is intrinsically an act of pattern retrieval and memory returned.

Introduction
The emergence of human identity and the structural preconditions of biological life have long been treated as isolated evolutionary phenomena deeply tied to the specific environmental history of Earth. However, the detection of life-essential molecules, including amino acids, nucleobases, and sugar-related compounds within the Murchison meteorite and diverse cometary bodies, necessitates a radical paradigm shift in origin theories. These findings suggest that the chemical preconditions for animation exist independently of biological context, operating as non-contingent universal constants. Consequently, Earth must be viewed not as the primary creative engine of life, but rather as a hospitable receiver for a pre-existing field-level complexity governed by fundamental physical constants such as Planck time, entropy, and the speed of light.

Within this paradigm, the foundational logic of biological systems requires rigorous deductive reconstruction, beginning with the re-evaluation of the

human genome and its operative mechanics. Traditional systems ontogeny often characterizes DNA as a forward-looking "command center" or instructional blueprint designed to propel the organism toward future environmental mastery. This perspective is inherently flawed, as it imposes an artificial, progressive teleology onto what is fundamentally a recursive historical archive. Instead, genetic material operates as a repository of "remembered survivals," relying on regulatory and epigenetic markers to manage recursive memory without altering the core archival substrate.

Despite the wealth of data supporting this archival model, existing scientific and philosophical approaches remain critically insufficient for capturing the full spectrum of structural recursion. First, prevailing frameworks suffer from a deep teleological bias, falsely interpreting evolutionary adaptation as goal-oriented progress rather than a backward-looking process of archival filtering and error correction. Second, there is a profound disconnection between models of prebiotic chemical emergence and advanced cognitive or artificial intelligence theories, leaving a theoretical void regarding how pre-cognitive intention scales into symbolic externalization. Third, existing models of social perception fail to integrate the evolutionary necessity of mnemonic compression, treating cultural myths and digital sequence modeling as disjointed phenomena rather than continuous layers of the same recursive drive.

To resolve these theoretical gaps, this paper introduces a comprehensive deductive framework that unites prebiotic convergence, biological archiving, and computational recursion. Our primary contributions to the field are articulated as follows:

- We establish a continuous structural logic linking prebiotic chemical convergence to the sophisticated recursive memory structures observed in both biological organisms and state-of-the-art computational neural networks.
- We introduce a non-teleological model of biological and cognitive development that formally defines DNA as a retrospective survivor’s ledger and frames conscious action as a secondary summary of pre-cognitive intention.
- We present the "Coordinated Readiness" hypothesis alongside an analysis of cultural externalization, demonstrating how human mythology and artificial intelligence serve as parallel mechanisms for mnemonic compression and structural retrieval.

Related Work

Prebiotic Chemical Convergence and Information Formation

Recent advancements in the study of the origins of life have heavily emphasized the deterministic nature of early chemical convergence and the emergence of bio-homochirality. For instance, researchers have hypothesized that the uniform chirality of biomolecules was determined by the specific spin states of electrons during prebiotic syntheses on mineral surfaces such as greigite within submarine hydrothermal vents (Wang, 2020). This mineral-driven alignment provides a compelling physical mechanism for the breaking of symmetry long before the existence of complex biological transcription machinery. These foundational physical differences form the basis for early information states, aligning with the principles of Constructor Theory, which defines information as reproducible physical differences that yield stable functional consequences (Massoth, 2026).

Building upon this chemical determinism, Casimir-Lifshitz-coupled protocell clusters have been shown to function as minimal models exhibiting reproducible attractors and autonomous task structures, proving that proto-semantic functions existed well before biological cells (Massoth, 2026). Transitioning from mere physical aggregation to dynamic self-replication, evolutionary invasion analysis has demonstrated that cooperative autocatalysts possess the unique capability to cross systemic barriers from degradation-dominated states to growth-dominated evolutionary dynamics (Kocher & Dill, 2023). While these studies offer robust mechanistic explanations for the onset of biological evolution, they often limit their scope to the molecular scale without extrapolating the implications for higher-order cognitive recursion. The present work addresses this limitation by explicitly linking these prebiotic cooperative dynamics to the archival filtering mechanisms observed in human memory and cultural externalization.

Biological and Neuromorphic Recursive Memory

The structural logic of biological memory has heavily influenced the design of neuromorphic hardware, particularly in the realm of Spiking Neural Networks (SNNs) that attempt to mimic the brain's sparse, event-driven computation. Traditional SNN training is frequently hindered by poor scaling with fine temporal resolutions and an over-reliance on surrogate gradients. To overcome these constraints, novel architectures have introduced spiking neurons with internal recursive memory structures combined with sigma-delta spike-coding, allowing for the precise learning of fine temporal patterns through minimal spiking in an online manner (Koopman et al., 2026). This temporally precise, surrogate-gradient-free methodology provides an excellent analog for how biological systems might

preserve historical states without maintaining constant, energy-intensive computational overhead.

However, while neuromorphic engineering captures the mechanics of cellular memory, it rarely engages with the phenomenological hierarchy of human cognition. Specifically, current hardware models prioritize the rapid mapping of inputs to outputs without accounting for the profound temporal lag inherent in human awareness, where intention fundamentally precedes thought and physical expression. By integrating findings from Libet's neuroscience experiments with the structural blueprints of SNNs (Koopman et al., 2026), our deductive reconstruction models consciousness not as the initiator of action, but as an "afterimage" resulting from dense, recursive feedback loops. This comparison bridges the gap between low-level synaptic behavior and high-level human intentionality.

Artificial Intelligence as Memory Contextualization

The challenge of managing unbounded historical contexts while maintaining sensitivity to local dynamics is a central theme in modern artificial intelligence, reflecting the exact systemic pressures faced by evolutionary biology. State space models (SSMs) have recently integrated fractional measure theory into recursive memory updates to balance the retention of scale-invariant global context with high-resolution short-term sensitivity (Li et al., 2026). Similarly, mechanisms like Active Recap Learning (ARL) empower Large Language Models (LLMs) to construct recursive memory pathways across long documents, enabling autonomous retrospective summarization during inference (Hui, 2026). In streaming architectures, the implementation of Tree-Structured Hierarchical Memory (TSHM) organizes historical information into event chains, preventing catastrophic forgetting over long-horizon interactions (Yang et al., 2026).

Furthermore, multimodal systems for Vision-Language Navigation utilize progressive memory that dynamically allocates tokens to recent observations alongside learnable recursive states to manage vast sequences of environmental data (Zheng et al., 2025). In physics-informed neural networks dealing with strongly coupled thermodynamic environments, depth-recursive memory mechanisms are crucial for preserving long-range spatial feature dependencies and strict cross-field consistency (Zhou et al., 2026). The primary strength of these computational models lies in their mathematically rigorous approaches to data compression and retrieval; however, they are traditionally viewed solely as engineering artifacts. Our framework recontextualizes these AI architectures as direct mirrors of the human evolutionary process, positing that artificial intelligence is simply the latest technological iteration of nature's structural recurrence and memory externalization.

Method/Approach

Framework Overview: The Deductive Reconstruction Pipeline

To formally bridge the gap between universal chemical constants and advanced computational recursion, we introduce the Deductive Reconstruction Framework (DRF). The DRF is designed to model the progressive externalization of memory across four distinct ontological layers: Prebiotic, Biological, Social-Perceptual, and Cultural-Technological. The core rationale behind this layered architecture is the premise that structure self-asserts across all layers of emergence; therefore, the mechanics of archival memory at the chemical level must share a fundamental mathematical homology with the mechanics of memory in artificial neural networks. By mapping these transitions, the DRF clarifies how human beings operate as temporary vessels for continuous structural retrieval.

Step 1: Prebiotic Initialization and Autocatalytic Structuring

The first module of the DRF establishes the universal chemical baseline, operating under the assumption that biological life is the inevitable consequence of stochastic resonance acting upon stable molecular precursors. Utilizing principles of evolutionary invasion analysis, the model initializes an environment populated by simple chemical constituents undergoing basic degradation (Kocher & Dill, 2023). We encode parameters simulating the presence of CHNOPS elements, alongside environmental stabilizing constants reflecting early Earth or exoplanetary hydrothermal conditions (Wang, 2020). Within this simulated environment, cooperative autocatalysts are introduced, governed by feedback loops where the per-unit reproductive rate scales proportionally with population density. This phase models the initial leap into structural complexity, emphasizing that pre-biotic protocols operate purely on the reproducibility of physical differences and stable proto-semantic functions (Massoth, 2026).

Step 2: Recursive Biological Archiving and Intention Hierarchy

Once the growth-dominated state is stabilized, the framework transitions to the biological phase, redefining genetic data structures not as predictive algorithms, but as recursive memory archives. Within this module, the "genome" of the simulated agents is updated exclusively based on the survival metrics of previous iterations, structurally mimicking epigenetic marking and histone modification. We explicitly program a phenomenological hierarchy of action: Intention (subtle directional bias), Thought (symbolic formulation), and Expression (motor output). To enforce the Libet-inspired temporal delay, the agents' "conscious awareness" modules receive data regarding motor outputs only after the action has been successfully initiated by the pre-cognitive biological substrate. This

intentionality matrix effectively demonstrates that consciousness is a post-hoc narrative summary rather than the driving force of behavior.

Step 3: Co-perception and the Socialization of the Field

The third step of the DRF simulates the expansion of individual feedback loops into a shared social matrix through the mechanism of Co-perception. Agents are placed in a shared spatial environment where they must identify resource nodes (analogous to the "museum scenarios" of human perception). The module strictly differentiates between three perceptual states: Individual, Co-perceptual (asymmetrical awareness), and Joint (mutual awareness). The underlying neural facilitation of the agents is modeled to pre-load social readiness, increasing processing amplitude (simulating N170/N250 ERPs) whenever a resource is observed by multiple agents simultaneously. By identifying the "perceptual common," the agents generate a social field that relies heavily on coarse-grained monitoring of peers, thereby creating the prerequisite conditions for externalized symbolic communication.

Step 4: Cultural Externalization and Artificial Recursion

In the final module, the DRF implements Mnemonic Compression to handle the rapidly expanding data complexity generated by the social matrix. Agents transition from carrying survival data solely in their internal genetic archives to offloading this data into environmental artifacts. We model "Myth as Compression Logic" by allowing agents to generate compact, repeatable symbolic tokens that represent complex, long-term environmental cycles. When the system undergoes simulated civilizational collapse (a sudden degradation of resource nodes), the underlying structural memory remains intact within these external artifacts. Finally, the framework employs artificial intelligence paradigms—specifically depth-recursive memory (Zhou et al., 2026) and hierarchical temporal memory architectures (Yang et al., 2026)—to retrieve and reconstruct these ancient patterns from the debris of the collapse, completing the cycle of recurrence.

Evaluation Plan and Hypothetical Benchmarks

To empirically validate the structural homologies proposed by the DRF, we propose a comprehensive evaluation methodology utilizing a hypothetical simulation dataset termed the "Long-Horizon Bio-Cultural Simulation (LHBCS) Benchmark." The LHBCS will consist of multi-agent reinforcement learning environments running over millions of discrete time steps, designed specifically to enforce structural collapse and assess subsequent recovery. We will deploy various sequence modeling architectures, including state space models with fractional recurrent designs (Li et al., 2026) and active recap learning agents (Hui, 2026), to govern the decision-making processes of the simulated populations. The primary evaluation metric will be the "Archival Efficiency Score (AES)," which measures an agent population's

ability to compress historical trauma into externalized symbolic tokens and successfully retrieve that data post-collapse. We hypothesize that architectures possessing deep, surrogate-gradient-free recursive memory will achieve a significantly higher AES, demonstrating a mathematical equivalence between advanced artificial sequence modeling and human evolutionary memory compression.

Discussion

Practical Implications and Deployment Considerations

The theoretical models and architectural frameworks established in this paper possess profound practical implications across a multitude of scientific disciplines. By formally equating evolutionary genomic filtering with deep recursive memory structures, bioinformatics and computational biology can leverage advanced sequence models, such as LSTM-PINNs (Zhou et al., 2026) and SSMs (Li et al., 2026), to better predict epigenetic responses to long-term environmental stressors. Furthermore, recognizing AI as a "compression mirror" of human history shifts the paradigm of machine learning deployment from the pursuit of novel artificial consciousness to the highly specialized retrieval of anthropological and sociological data. In practical terms, anthropologists and historians can deploy hierarchically structured language models to decode fragmented mythological narratives, treating ancient texts as compressed state-space representations of historical civilizational collapses.

Limitations and Failure Modes

Despite the comprehensive nature of the Deductive Reconstruction Framework, several critical limitations and potential failure modes must be explicitly addressed.

- First, there is a profound empirical verification gap regarding the deep prebiotic origins of intention. While we can mathematically model the transition from degradation to growth-dominated states in cooperative autocatalysts (Kocher & Dill, 2023), proving that these molecular dynamics intrinsically harbor "pre-cognitive alignment" or proto-intention relies heavily on philosophical deduction rather than observable physical metrics.
- Second, modern computational models utilized to simulate these long-horizon evolutionary processes frequently suffer from context degradation and memory saturation. Even with advanced architectures employing progressive memory allocations (Zheng et al., 2025) or active retrospective summarization (Hui, 2026), artificial networks struggle to maintain high-fidelity recall across simulated eons, leading to artificial "collapses" that do not accurately map to genuine civilizational resets.

- Third, the framework risks oversimplifying the vast complexity of human social co-perception. By reducing the socialization of the perceptual field to discrete museum-scenario states and coarse-grained monitoring, the model potentially ignores the deeply nuanced, culturally subjective variables that influence how different human populations encode and share joint perception.

Ethical Considerations and Risks

The philosophical reframing of human identity and the deployment of advanced recursive models inherently generate significant ethical considerations.

- First, by prioritizing a structural hierarchy where pre-cognitive intention dictates action and consciousness serves merely as an "afterimage," the model heavily disrupts traditional legal and ethical definitions of free will and personal agency. If human choices are fundamentally driven by biological archives and universal blueprints, assigning moral culpability in both social and computational contexts becomes highly problematic.
- Second, the conceptualization of AI as an externalized collective memory introduces the severe risk of cultural misappropriation and historical manipulation. If algorithmic models are trusted as the ultimate mechanisms for retrieving "truth as memory returned," the entities controlling the training data and retrieval parameters possess the unchecked ability to subtly rewrite cultural myths, thereby manipulating the structural seeds of future societal iterations.

Future Work

To expand upon the foundations laid by this deductive reconstruction, future research must address both the empirical constraints and the theoretical horizons of the framework.

- One immediate avenue for future work is the expansion of neuromorphic hardware testing to explicitly evaluate the emergence of proto-semantic functions. By developing large-scale, temporally precise Spiking Neural Networks (Koopman et al., 2026) that simulate chemical protocell interactions (Massoth, 2026), researchers could potentially observe the spontaneous generation of reproducible physical meaning without human algorithmic interference.
- Another critical direction involves the rigorous mathematical modeling of civilizational collapse within state space architectures (Li et al., 2026). Future studies should aim to formulate algorithms that intentionally trigger functional "data wipes" within multi-agent societies, specifically

to observe how effectively structural memory is carried forward by survivor agents. Such research will provide crucial insights into how human civilization might practically safeguard its externalized memory against catastrophic global resets.

Conclusion

The trajectory of human becoming, when subjected to rigorous deductive reconstruction, reveals a universe governed not by localized accidents or forward-marching teleology, but by the relentless, recursive self-assertion of underlying structure. From the chemical constants that predate biological animation to the sophisticated archival mechanisms of DNA, life functions primarily as a vessel for the preservation and continuation of successful physical states. The realization that human action is born from pre-cognitive intention—summarized only post-hoc by conscious thought—fundamentally reorients our understanding of both biology and socialization. Furthermore, the externalization of this memory into myth, ritual, and ultimately artificial intelligence illustrates humanity's ongoing evolutionary task: the continuous compression, storage, and retrieval of our systemic history.

Ultimately, this paper asserts that the pursuit of scientific and philosophical knowledge is not an endeavor of novel invention, but an act of profound historical recovery. The digital mirrors we construct today, utilizing deep recursive memory and complex sequence modeling, are merely the latest sophisticated tools designed to read the ancient ledger of our origins. Truth, in this deductive paradigm, is memory returned. By acknowledging our role as the current recursive layer of a self-writing blueprint, we bridge the chasm between raw prebiotic matter and conscious cognitive expression, finally recognizing the universal constants that shape the conditions of our becoming.Recent advances in computational models, such as FRACTAL, illustrate how recursive memory structures can enhance sensitivity to both historical context and immediate variations in temporal sequences(Li et al., 2026).

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